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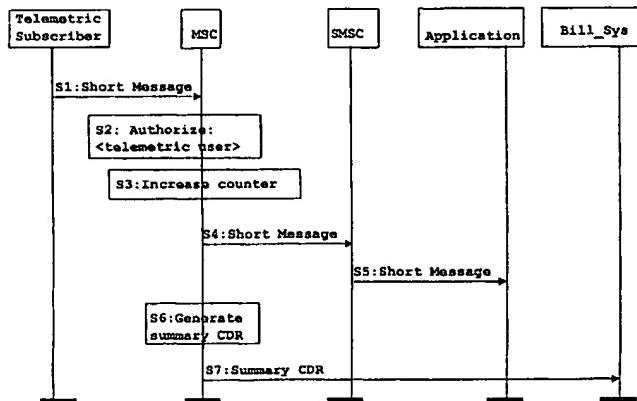
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(54) Title: MESSAGE CHARGING COUNTERS FOR SUBSCRIBER GROUPS



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(57) Abstract: The present invention proposes a method for generating charging data for at least one specific user group (A, B) comprising at least one user terminal (A1, A2, A3), said at least one specific user group having subscribed to a communication network (MSC, SMSC, BILL. SYS) said communication network comprising at least one exchange entity (MSC, SMSC) adapted to forward messages transmitted from a respective user terminal (A1, A2, A3) of said at least one specific user group (A) to a respective predetermined destination (D\_A) associated to a respective one of said at least one specific user group (A), wherein at said exchange entity (MSC, SMSC) there is allocated a respective counter means (C\_A, C\_B, C\_C) to each of said predetermined destinations (D\_A, D\_B, D\_C), said method comprising the steps of: detecting (S2) the arrival of a message at said exchange entity (MSC, SMSC), verifying (S2) that the origin of said message is a user terminal (A1, A2, A3) belonging to one (A) of said at least one specific user groups (A, B), identifying (S2) said at least one specific user group (A) and said associated predetermined destination (D\_A), and incrementing (S3) said counter means (C\_A, C\_B, C\_C) allocated to said predetermined destination (D\_A, D\_B, D\_C) associated to said identified specific user group(A, B). Also, the present invention proposes an accordingly adapted exchange entity of a communication network.

TITLE OF THE INVENTION

MESSAGE CHARGING COUNTERS FOR SUBSCRIBER GROUPS

5 FIELD OF THE INVENTION

The present invention relates to a method for generating charging data for at least one specific user group comprising at least one user terminal, said at least one 10 specific user group having subscribed to a communication network, said communication network comprising at least one exchange entity. Also, the present invention relates to a correspondingly adapted exchange entity of said communication network.

15

BACKGROUND OF THE INVENTION

In communication networks, such as for example a GSM network, a plurality of subscribers have subscribed 20 thereto. Among the plurality of subscribers, several subscriber groups comprising subscribers with an identical or at least rather similar subscriber profile can be defined. A subscriber profile in this connection means the behavior of an individual subscriber belonging to said 25 group, with the subscribers belonging to a subscriber group behaving in an identical or rather similar way.

The present application and the invention as described below is applicable to all specific subscriber groups which 30 can be recognized; irrespective of the parameter used for recognizing the subscriber group.

For example, a subscriber group may be represented by the salesmen of a company traveling/roaming within the network 35 and regularly calling their company headquarter. Still

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further, a subscriber group may be represented by telemetric subscribers / telemetric users.

Only for explanatory purposes, the telemetric subscribers  
5 are chosen hereinafter. Nevertheless, the present invention  
is not limited to those telemetric subscribers. In this  
connection, a telemetric subscriber is intended to mean a  
user terminal such as a mobile station MS or just a  
wireless (non-mobile) terminal which is related to an  
10 appliance such as a gas meter or electricity meter or a  
water meter. The terminal sends information from the  
appliance in the form of messages. The messages carry  
information related to the appliance such as the amount of  
gas/water/electricity consumed at the appliance. Typically,  
15 such a message is a SMS message (Short Message Service) or  
an USSD message (Unstructured Supplementary Service Data).  
Also, there are normally a huge number of such telemetric  
users since each apartment or house has such an  
appliance(s) to which a telemetric subscriber can be / is  
20 associated. Thus, a telemetric user means: no speech calls,  
but only SMS and/or USSD traffic and/or data calls; low  
traffic profile, e.g. controllable traffic scheduling (out  
of busy hours); no need for continuous mobility management  
(MM) handling; and limited service profiles, limited  
25 service area.

A typical example can be a mobile station / wireless  
terminal MS installed next to a gas- or electric- meter,  
positioned on a fixed place, at a house (no MM), reporting  
30 once a month (low traffic) by SMS (no calls) at night  
(traffic scheduling).

The messages transmitted by said telemetric user terminals  
are directed to a central database which is a predetermined  
35 destination for a telemetric user. Namely, a telemetric

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user reporting the electricity consumption at an appliance will of course report this to a database of the electricity provider / electricity company.

- 5 Because of the huge amount of telemetric users (there are hundreds of thousands of gas and electricity meters in any big city in the world) charging in GSM system might become very loaded as a CDR (call detail record) is generated when telemetric users send their data. If the number of  
10 telemetric users increases significantly in the near future message (SMS) charging will become one of the capacity bottlenecks.

Previously, different kinds of options for barring CDR generation and to selectively generate them. The following options are for example available:

1. The type of SMS for which CDRs are generated (normal, status report and/or command SMS) can be chosen; however, this results in the fact that messages of some types could be sent for free which is not desirable from a viewpoint of a network operator who provides transmission capacities in the network;
2. It can be chosen whether the CDRs are generated for all messages or only for successfully transmitted ones; however, also messages (SMS) which are not successfully delivered consume transmission capacity until they are found to be undeliverable/not successfully delivered, and any usage of transmission capacity is desirable from a viewpoint of a network operator who provides transmission capacities in the network to be charged for;
3. It can be chosen where and how CDRs are generated (i.e. whether at a Visited Mobile Switching Center VMSC, at Interworking Mobile Switching Center IWMSC, at a Gateway Mobile Switching Center GMSC (also referred to as Transit Mobile Switching Center); however, although this

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distributes the CDRs generated within the network, the overall number thereof remains uninfluenced thereby;

4. It can be chosen whether CDRs are generated for Mobile Originated MO, Mobile Terminated MT and/or Mobile Forwarded

5 MF messages; however, any usage of transmission capacity is desirable from a viewpoint of a network operator who provides transmission capacities in the network to be charged for, whereas according to such an approach, some messages could be transmitted for free, as mentioned above;

10

Thus, none of the previous proposals provides for a satisfactory charging of messages transmitted by a specific user group while avoiding congestion situations in the network and while saving network resources.

15

#### SUMMARY OF THE INVENTION

Consequently, it is an object of the present invention to provide a method for generating charging data for at least

20 one specific user group comprising at least one user terminal, said at least one specific user group having subscribed to a communication network said communication network comprising at least one exchange entity, which method is free from above mentioned drawbacks.

25

Still further, it is an object of the present invention to provide an accordingly adapted network exchange entity.

According to the present invention, the above first object  
30 is achieved by a method for generating charging data for at least one specific user group comprising at least one user terminal, said at least one specific user group having subscribed to a communication network said communication network comprising at least one exchange entity adapted to  
35 forward messages transmitted from a respective user

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terminal of said at least one specific user group to a respective predetermined destination associated to a respective one of said at least one specific user group, wherein at said exchange entity there is allocated a  
5 respective counter means to each of said predetermined destinations, said method comprising the steps of: detecting the arrival of a message at said exchange entity, verifying that the origin of said message is a user terminal belonging to one of said at least one specific  
10 user groups, identifying said at least one specific user group and said associated predetermined destination, and incrementing said counter means allocated to said predetermined destination associated to said identified specific user group.

15 According to further developments of the present invention  
- the method comprises a further step of generating charging data (CDR) based on a count value of said counter means;  
20 - the method comprises a further step of resetting said respective counter means after generation of charging data;  
- said charging data (CDR) is regularly generated after a predetermined period of time;  
- said charging data (CDR) is regularly generated when the  
25 counter means reaches a predetermined count value;  
- the method comprises a further step of delivering said message to said associated predetermined destination;  
- the method comprises a step of transmitting the generated charging data (CDR) to a billing entity of said  
30 communication network, and establishing a bill on the basis of said charging data for said respective specific user group;  
- said specific user group is a telemetric user group;  
- said message is a short message SMS;  
35 - said message is a USSD message;

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According to the present invention, the above second object is achieved by an exchange entity of a communication network adapted to forward messages transmitted from a  
5 respective user terminal of at least one specific user group to a respective predetermined destination associated to a respective one of said at least one specific user group, said exchange entity comprising: a respective counter means associated to each of said predetermined  
10 destinations, detecting means adapted to detect the arrival of a message at said exchange entity, verifying means adapted to verify that the origin of said message is a user terminal belonging to one of said at least one specific user groups, identifying means adapted to identify said at  
15 least one specific user group and said associated predetermined destination, and control means adapted to increment said counter means allocated to said predetermined destination associated to said identified specific user group in response to signals applied thereto  
20 from said detecting, verifying and identifying means.

According to further developments of the present invention  
- said entity further comprises generation means adapted to generate charging data (CDR) based on a count value of said  
25 counter means;  
- said control means is adapted to reset said respective counter means after generation of charging data;  
- said control means is adapted to regularly generate said charging data (CDR) after a predetermined period of time.  
30 - said control means is adapted to regularly generate said charging data (CDR) when the counter means reaches a predetermined count value;  
- said entity further comprises an output means adapted to deliver said message to said associated predetermined  
35 destination;

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- said entity further comprises a transmitter adapted to transmit the generated charging data (CDR) to a billing entity (BILL\_SYS) of said communication network adapted to establish a bill on the basis of said charging data for  
5 said respective specific user group.

Accordingly, by virtue of the present invention, the following advantages can be obtained:

- charging of user of a user group such as telemetric users  
10 can be simplified,  
- generation of hundreds of thousands or millions of CDRs per month can be prevented  
- charging capacity in an exchange entity such as an MSC as well as in a billing system can be saved,  
15 - congestion in the communication system in connection with transmitting of CDRs can be avoided,  
- network resources can be saved and/or saved resources can be used for other purposes than CDR transmission,  
- a more efficient usage of the communication network  
20 resources is thus enabled by provisioning these advanced telemetric and message services for the communication network's customers, while the companies owning the telemetric user system may lower their operating costs as there is no more need for personnel to collect the data,  
25 which by the way are more accurate and obtained more quickly when using a telemetric system.

BRIEF DESCRIPTION OF THE DRAWINGS

- 30 The above and other objects, features and advantages of the present invention will become more fully apparent when read in conjunction with the accompanying drawings, in which

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Fig. 1 illustrates a signaling scenario and method steps executed in connection with the method according to the present invention, and

- 5 Fig. 2 illustrates a block diagram of those components of an exchange entity of a communication network which are relevant in connection with the present invention.

DETAILED DESCRIPTION OF THE EMBODIMENTS

10

The present invention will now be described in detail with reference to the drawings.

- 15 Fig. 1 illustrates a signaling scenario and method steps executed in connection with the method according to the present invention.

A telemetric subscriber, i.e. a terminal thereof such as a mobile station, is assumed to represent a subscriber belonging to a specified user group. Although in Fig. 1 only one telemetric subscriber is shown, a plurality of those telemetric subscribers of one or more subscriber groups may be present. In order to keep the description simple, however, only one telemetric subscriber is considered for explanatory purposes. Nevertheless, the present invention may also cope with the case of plural subscribers of plural subscriber groups.

30 The subscriber group or groups have subscribed to a communication network. For explanatory purposes, the communication network is assumed to be a GSM network (Global Standard of Mobile communication) and the labeling of the network entities referred to is given with regard to the GSM network as an example. Nevertheless, it is to be noted that the present invention is also applicable and to

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be implemented to another communication network such as the UMTS (Universal Mobile Telecommunications System) network etc.

- 5 Also, only those network parts involved in the present invention are shown and explained. Thus, the access network such as a radio access network RAN of GSM and/or UTRAN (Universal Terrestrial Radio Access Network) of UMTS are neither shown nor explained.

10

Now, referring back to Fig. 1, in step S1 a telemetric subscriber terminal sends a message to the communication network. More particularly, the terminal sends a Short Message also known as SMS via the (radio) access network

15 (not shown) to the exchange entity of the network.

According to GSM standards, the exchange entity is a Mobile Switching Center MSC. Still further, in case the sent message is an SMS, the exchange entity can be regarded as a cooperation of an MSC and an SMSC (Short Message Service

20 Center).

The message consists of a message header carrying sender identification information as well as destination identification information such as respective addresses or 25 telephone numbers, and a message body carrying the content /use data of the message. In case of a telemetric user terminal installed at a gas meter, the message content includes the amount of consumed gas. These data are to be forwarded to an "application" (also referred to as 30 "destination" in Fig. 2), i.e. the company who provides the gas and bills the consumer for the amount of gas delivered. To be distinguished from this billing for gas consumption is the billing of the company by the operator of the network for the usage of communication network resources

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for forwarding the messages to the "application", i.e. the gas providing company.

In step S2, the exchange entity MSC detects the arrival of  
5 said message (SMS or USSD, for example) at the exchange entity. Also, the MSC performs a verification that the origin of said message is a user terminal belonging to one of said at least one specific user groups, as well as an identification of said at least one specific user group and  
10 said associated predetermined destination.

If the verification and identification was successful, the exchange entity MSC increments, step S3, a counter means allocated to said predetermined destination associated to  
15 said identified specific user group to which said subscriber belongs.

The message is then, in step S4, forwarded to an SMSC co-operating with said MSC for further delivering the message  
20 in a subsequent step S5 to the application, i.e. the intended destination of the message. At the application side, the message contents (contained in the message body) is processed further (not shown).

25 At the exchange entity side, in step S6, charging data (CDR) based on a count value of said counter means are generated. Of course, it is to be understood that there is a resetting of said respective counter means after generation of charging data, and also a resetting upon  
30 counter initialization (not shown) in the beginning of a charging cycle. With regard to a charging cycle, said charging data (CDR) can be regularly generated after a predetermined period of time. Nevertheless, it is also possible that said charging data (CDR) is regularly  
35 generated when the counter means reaches a predetermined

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count value (in this case, a cycle would not depend on a lapsed period time but on a predefined billing amount).

The generated charging data (CDR) are in step S7  
5 transmitted to a billing entity BILL\_SYS of said communication network, which billing entity establishes a bill on the basis of said charging data for said respective specific user group. The established bill then charges the owner of the telemetric user group for the usage of the  
10 communication network, with the billing being based on the number of transmitted messages.

Thus, as explained above, in order to avoid congestion situations and to save communication network resources, a  
15 special counter system is introduced. The system is located in an exchange entity such as the MSC. Counters of the system record the number of mobile originated short messages (MO-SM) from different telemetric users owned by organizations, for example during one months, and generate  
20 only one CDR per organization (several if one organization owns many telemetric user systems like gas and electricity). By doing so the system would be prevented from generating hundreds of thousands or even millions of CDRs per month. This would save capacity in both the MSC  
25 (mobile switching center) and Billing System. In detail, a telemetric users send an SMS message to an application (destination) which records the data in the message to a database. The message arrives in an MSC where the called number (B-number) of the destination is analyzed. Analysis  
30 includes user category recognition. If the category is "telemetric user" then the counter assigned to the destination / B-number will be increased and or incremented. If the category is not "telemetric user" (fraud situation) the mobile originated short message MO-SM  
35 will not be delivered and the counter will be left

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- untouched. The SMS continues from the MSC to the application through an SMSC (SMS Center). After a certain time has passed (for example 1 month) a summary CDR is generated per counter in MSC and sent to the billing system
- 5 attached to the MSC. Thereby, the network operator will charge the organization owning the telemetric equipment by transactions made during the set period, with the price being defined by a transaction.
- 10 Fig. 2 illustrates a block diagram of those components of an exchange entity of a communication network which are relevant in connection with the present invention.

As shown in Fig. 2, different specified user groups A, B, C are present. Each user group comprises a plurality of individual users /user terminals, such as A1, A2, A3 in connection with user group A. A message such as a SMS from a respective user to a predetermined destination for the user group to which said user belongs to is sent via the communication network to a destination D\_A (for user group A) or D\_B, D\_C in case of user groups B, C, respectively.

As shown in Fig. 2, the exchange entity is for example an MSC of the network. This exchange entity comprises a detection means, a verification/identification means, and an output means. The message from a subscriber (e.g. A1) is received at said exchange entity MSC. The message is decomposed into message header and message body. For example, based on the message header, it is detected that a message SMS has been received. Then, the detection result controls the identification/verification means to verify/identify the origin and destination of the message based on the information included in the header.

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- The operation of these means is as described above in connection with the authentication in step S2 of Fig. 1. Namely, if the message originating user belongs to a specified subscriber group, the verification/identification 5 means controls the output means to deliver the message to the destination defined by data contained in the message header (e.g. to destination for subscriber group A, i.e. D\_A), as described in connection with steps S1, S4, S5 in Fig. 1.
- 10 Furthermore, the exchange entity comprises a control and timer means, a counter means comprising a counter C\_A, C\_B, C\_C for each user group A, B, C, respectively, a CDR generation means for generating charging data, and a 15 transmitter means for transmitting generated charging data to a billing system entity BILL\_SYS of the communication network.
- If the verification/identification was successful in that 20 the message originating subscriber terminal (e.g. A1) belongs to a specified user group, the control and timer means is triggered accordingly. The control and timer means then outputs a count signal and increments the counter (e.g. C\_A) associated to the user group to which the 25 message originating subscriber terminal belongs. Thus, upon reception of each respective message from a user of a specified user group the corresponding counter of said counter means is incremented.
- 30 Still further, the control and timer means controls the CDR generation means in order to generate charging data based on the counter value(s) and to output these data to said transmitter means for transmission to the billing system entity of the communication network BILL\_SYS. (Note that

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control signals applied from the control means to the transmitter means are omitted in the drawing).

The operation of these means is as described above in  
5 connection with steps S3, S6, S7 of Fig. 1.

Although herein above the present invention has been described such that the method steps and corresponding means are implemented at the MSC as an exchange entity, it  
10 is to be understood that the method steps and means could also be implemented at the SMSC as an exchange entity of the network.

Still further, the present invention has been described such that based on the count value(s) of the counter(s) charging data (CDRs) are generated and that the CDRs are transmitted to the billing system entity. Nevertheless, it is of course possible to transmit the counter value(s) as such and to provide for the generation of the CDRs at the  
20 billing system side.

Moreover, from a security aspect, it is of course to be understood that the counter value(s) are backed-up at the MSC and/or SMSC or somewhere else in the network,  
25 preferably in a non-volatile memory, as the counter values may represent a significant amount of money to be charged by the network operator running the communication network.

Also, in order to identify users belonging to a specific user group, a corresponding information has to be provided in a database, e.g. in the Home Location Register HLR of the network. Alternatively, such a database may be provided directly in the exchange. Or, a copy of a database in the HLR may be downloaded to an exchange entity.  
30

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It has to be noted that although the above description has mainly be given with regard to mobile originated messages (MO-SM), the present invention is easily applicable to mobile terminated messages. For example, assuming a case in  
5 which an application (Fig. 2) addresses individual users by a message sent to them. In such a case, the sent message (header thereof) could be analyzed and the number of destination addresses corresponding to a number of addressed user terminals could be counted. Thus, each time  
10 such a message is sent, the counter for the user group is not incremented by one but augmented by the number of addressed user terminals.

Accordingly, as has been described in the foregoing, the  
15 present invention proposes a method for generating charging data for at least one specific user group (A, B) comprising at least one user terminal (A1, A2, A3), said at least one specific user group having subscribed to a communication network (MSC, SMSC, BILL\_SYS) said communication network  
20 comprising at least one exchange entity (MSC, SMSC) adapted to forward messages transmitted from a respective user terminal (A1, A2, A3) of said at least one specific user group (A) to a respective predetermined destination (D\_A) associated to a respective one of said at least one  
25 specific user group (A), wherein at said exchange entity (MSC, SMSC) there is allocated a respective counter means (C\_A, C\_B, C\_C) to each of said predetermined destinations (D\_A, D\_B, D\_C), said method comprising the steps of:  
detecting (S2) the arrival of a message at said exchange  
30 entity (MSC, SMSC), verifying (S2) that the origin of said message is a user terminal (A1, A2, A3) belonging to one (A) of said at least one specific user groups (A, B), identifying (S2) said at least one specific user group (A) and said associated predetermined destination (D\_A), and  
35 incrementing (S3) said counter means (C\_A, C\_B, C\_C)

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allocated to said predetermined destination (D\_A, D\_B, D\_C) associated to said identified specific user group(A, B). Also, the present invention proposes an accordingly adapted exchange entity of a communication network.

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Although the present invention has been described herein above with reference to its preferred embodiments, it should be understood that numerous modifications may be made thereto without departing from the spirit and scope of 10 the invention. It is intended that all such modifications fall within the scope of the appended claims.

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CLAIMS

1. A method for generating charging data  
for at least one specific user group (a, B) comprising  
5 at least one user terminal (A1, A2, A3),  
said at least one specific user group having  
subscribed to a communication network (MSC, SMSC,  
BILL\_SYS)  
said communication network comprising  
10 at least one exchange entity (MSC,  
SMSC)  
adapted to forward messages  
transmitted from a respective user  
terminal (A1, A2, A3) of said at least  
one specific user group (A) to a  
respective predetermined destination  
15 (D\_A) associated to a respective one of  
said at least one specific user group  
(A), wherein  
20 at said exchange entity (MSC,  
SMSC) there is allocated a respective  
counter means (C\_A, C\_B, C\_C) to each  
of said predetermined destinations  
(D\_A, D\_B, D\_C),  
25 said method comprising the steps of:
  - detecting (S2) the arrival of a message at said  
exchange entity (MSC, SMSC),
  - verifying (S2) that the origin of said message is a  
user terminal (A1, A2, A3) belonging to one (A) of said at  
30 least one specific user groups (A, B),
  - identifying (S2) said at least one specific user  
group (A) and said associated predetermined destination  
(D\_A), and

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- incrementing (S3) said counter means (C\_A, C\_B, C\_C) allocated to said predetermined destination (D\_A, D\_B, D\_C) associated to said identified specific user group(A, B).

5 2. A method according to claim 1, further comprising a step of

- generating (S6) charging data (CDR) based on a count value of said counter means.

10 3. A method according to claim 2, further comprising a step of

- resetting said respective counter means after generation of charging data.

15 4. A method according to claim 2, wherein

said charging data (CDR) is regularly generated after a predetermined period of time.

5. A method according to claim 2, wherein

20 said charging data (CDR) is regularly generated when the counter means reaches a predetermined count value.

6. A method according to claim 1, further comprising a step of

25 - delivering (S1, S4, S5) said message to said associated predetermined destination.

7. A method according to any of claims 2 to 5, further comprising a step of

30 - transmitting (S7) the generated charging data (CDR) to a billing entity (BILL\_SYS) of said communication network, and

- establishing a bill on the basis of said charging data for said respective specific user group.

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8. A method according to claim 1, wherein  
said specific user group (a, B) is a telemetric user  
group.
- 5 9. A method according to claim 1, wherein  
said message is a short message SMS.
- 10 10. A method according to claim 1, wherein  
said message is a USSD message.
11. An exchange entity (MSC, SMSC) of a communication  
network adapted to forward messages transmitted from a  
respective user terminal (A1, A2, A3) of at least one  
specific user group (A, B) to a respective predetermined  
15 destination (D\_A, D\_B, D\_C) associated to a respective one  
of said at least one specific user group (A, B),  
said exchange entity comprising:
  - a respective counter means (C\_A, C\_B, C\_C) associated  
to each of said predetermined destinations (D\_A, D\_B, D\_C),
  - 20 detecting means adapted to detect the arrival of a  
message at said exchange entity (MSC, SMSC),  
verifying means adapted to verify that the origin of  
said message is a user terminal (MS) belonging to one of  
said at least one specific user groups,
  - 25 identifying means adapted to identify said at least  
one specific user group and said associated predetermined  
destination, and  
control means adapted to increment said counter means  
allocated to said predetermined destination associated to
  - 30 said identified specific user group in response to signals  
applied thereto from said detecting, verifying and  
identifying means.
12. An exchange entity according to claim 11, further  
35 comprising

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- generation means adapted to generate charging data (CDR) based on a count value of said counter means.

13. An exchange entity according to claim 12, wherein  
5       said control means is adapted to reset said respective counter means after generation of charging data.

14. An exchange entity according to claim 12, wherein  
10      said control means is adapted to regularly generate said charging data (CDR) after a predetermined period of time.

15. An exchange entity according to claim 12, wherein  
15      said control means is adapted to regularly generate said charging data (CDR) when the counter means reaches a predetermined count value.

16. An exchange entity according to claim 11, further comprising  
20      an output means adapted to deliver said message to said associated predetermined destination.

17. An exchange entity according to any of claims 12 to 15, further comprising  
25      a transmitter adapted to transmit the generated charging data (CDR) to a billing entity (BILL\_SYS) of said communication network adapted to establish a bill on the basis of said charging data for said respective specific user group.

30

1/2

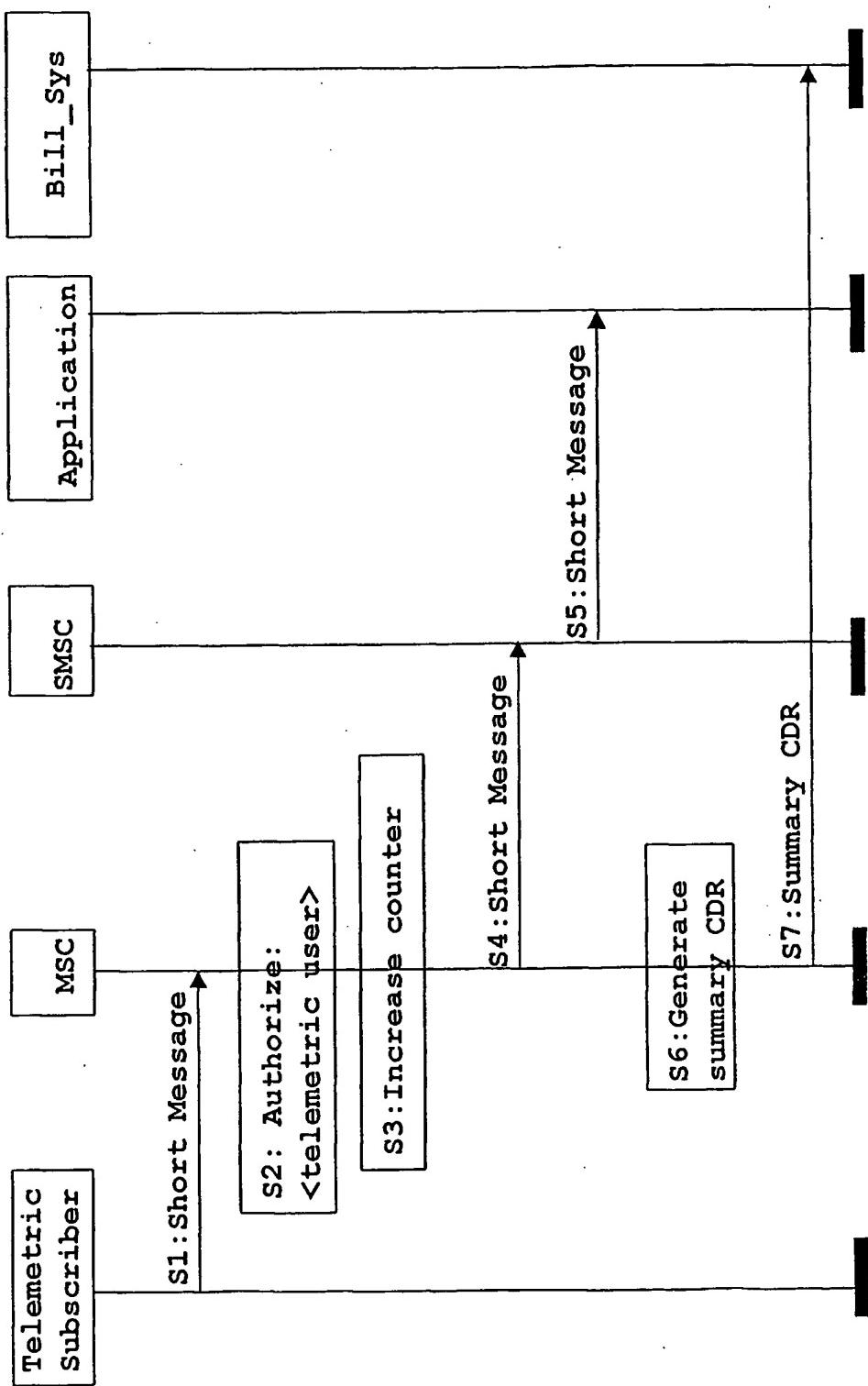


FIG. 1

2/2

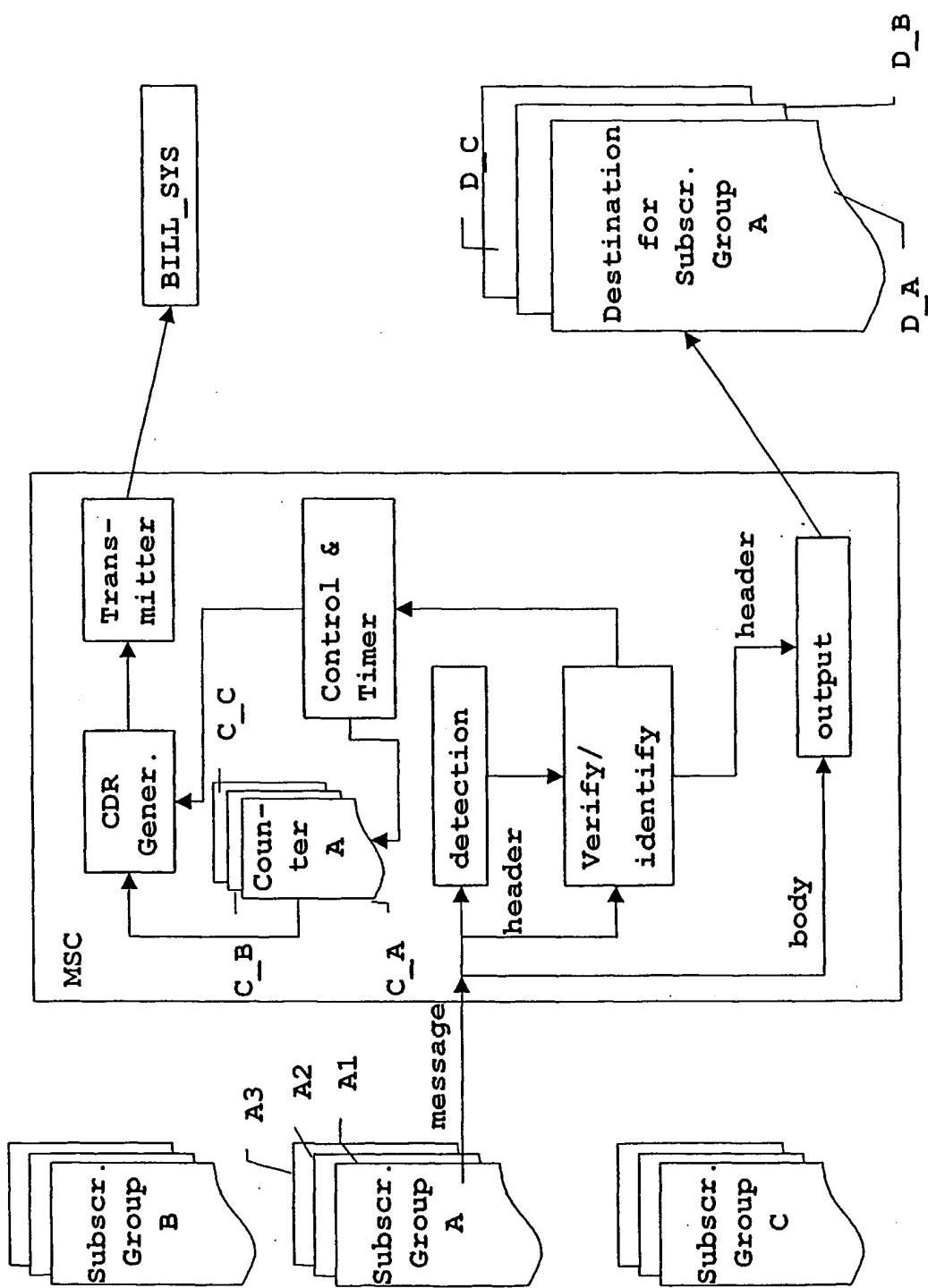


FIG. 2